

MONTANA

Wildlife

Autumn 1963



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Cover Picture



Photo by Leroy Ellig

This fine buck was taken in Beaverhead County of southwestern Montana. For thousands of sportsmen, Montana mule deer annually provide a climax to successful hunts.

The mule deer is native to North America and probably originated from a primitive Asian deer. They are believed to have migrated to this continent over a million years ago via a land bridge uniting these two continents.

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Editor—V. E. Craig

CONTENTS

	Page
DIRECTOR PAGE	2
THE AXOLOTL	3
SOME PARASITES OF MONTANA DEER.....	5
A MONTANAN ON KATMAI.....	14
MONTANA MAMMALS	18
LEISURE OUTDOORS	22
ANACONDA'S SPORTSMENS' PROJECT.....	27
THE INDIAN HUNTER.....	29



DEPARTMENT DIRECTOR
Frank Dunkle

Mr. Dunkle has been chief of Information and Education for the Fish and Game during the past five years. He and his wife Carol; daughters, Jane and Marilyn; and sons, Richard and Bruce, reside in Helena.

Mr. Freseman is a native of Lewistown, Montana. He attended both the University of Idaho at Moscow and George Washington University in Washington, D.C.

During World War II he served with the Amphibious Engineers and is presently a lieutenant colonel in the infantry reserve.

Mr. Freseman joined the department in 1948 as field auditor and has served as property officer since 1949. He and his wife, Vera, reside in Helena.

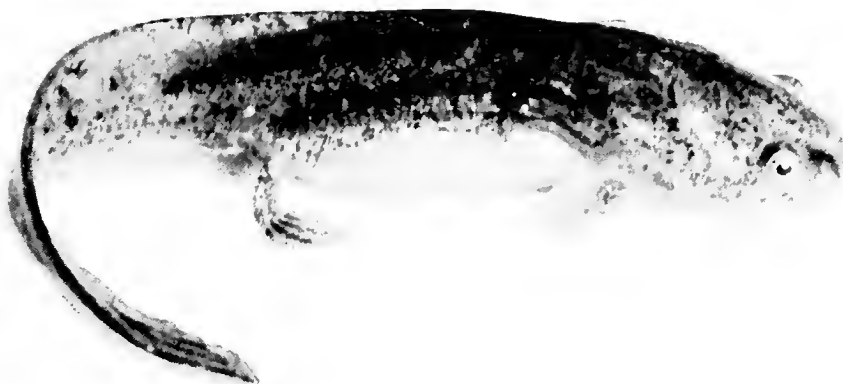
Frank H. Dunkle, former Information & Education Chief for the Fish and Game Department, has succeeded Walter J. Everin as Director of the Department. The Fish and Game Commission also named Keith Freseman to the position of Deputy Director.

Mr. Dunkle was born in Oakmont, Pennsylvania. He is a graduate of Montana State College and holds a BS degree in wildlife management and an MS in wildlife education and public relations.

The first duties of the Director with the Fish and Game Department were as deputy warden in the Dillon area during 1948. He became a warden in 1950 but was recalled to action with the Navy during the Korean conflict.

DEPUTY DIRECTOR
Keith Freseman





The Axolotl "Walking Fish"

By V. CRAIG—Photos by Author

The walking fish, strange creature, has caused many a new acquaintance to question the quality of his favorite snake bite medicine. This animal is more correctly called "Axolotl" and is not really a fish at all but a salamander that hasn't completely developed into what the well-matured salamander should be.

If you look Axolotl up in the dictionary, Webster will say he is any of the larval salamanders found in the mountain lakes of Mexico and western United States. Biologists, however, consider the Axolotl not as just a run-of-the-mill salamander, but one which becomes sexually mature while it is still in a larval stage. Neotenic is the high-classed word for this condition.

In Montana we have tiger salamanders on both sides of the divide, and it is the progeny of these amphibians that become Axolotls. Normally, the early or larval stages of salamanders begin their lives in a pond or lake after hatching from eggs. The eggs are laid either singly or in small clusters and stick to rocks, sticks, or other debris in the water. During the early stages of development, they look somewhat like the adults. They have four stubby legs, a tail which is much flatter than that of adults, and two buggy eyes. At first the young ones have very little color pattern and are a light drab brown.

Two big differences are that the young, or larvae, have a fin along the top of the tail and bushy gills protruding from above and behind the jaws. Since they breathe by gills, they must live entirely in the water at this time. In contrast, the adults have no outside gills but depend on lungs and free air for respiration. Before the larvae lose their gills they often get much larger than they will be as adults, in which case they shrink again during the final stages of change. A large larvae is nine or ten



The specimen at left, though larger than the other, has retained its gills and other larval characteristics. It could rightly be called an axolotl.

inches long, but generally much smaller at maturity. The subtle changes in development from larvae to adults is called metamorphosis.

Normally, this change-over (metamorphosis) takes only a year or so, but for some reason many refuse to lose their gills and fins although at the same time they become sexually mature. In mountain lakes, they reportedly may retain the out-

side gills for eight or nine years. In captivity, fully matured adults have been known to live thirteen years.

Just why Axolotls get stymied in their development is not known. Many theories have been advanced—the most popular contending that iodine deficient waters affect thyroid activity, thus disrupting normal growth of the salamanders.



These tiger salamanders from central Montana are typical of completely metamorphosed specimens. They depend upon air to breath, but inhabit damp or wet areas and spend much of their time in ground squirrel and rabbit burrows.

SOME PARASITES OF MONTANA DEER

CLYDE M. SENGER
Department of Zoology
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Missoula

Parasite Photos by Author



Most Montana deer have some insects and ticks on them, and many have liver flukes and bladderworms in their livers. These parasites are often noticed by hunters as they dress animals and many wonder what these organisms are and if they harm the meat in any way. For the last few years the author and others associated with the Montana Cooperative Wildlife Research Unit at Montana State University have been studying local deer to find some answers. The first phase of this study has been completed.

A word about parasites—Parasites are small animals which live in or upon the bodies of other animals and in some way harm their hosts. They are by no means rare, for most organisms have a variety of parasites to keep them company.

There are many kinds of parasites. The insect, tick and mite parasites which live on the outside of animals are well known. So are the deer flies, mosquitoes, and gnats which are considered to be parasites although temporary ones since they spend only part of their time on a host. The worm parasites such as tapeworms, roundworms, and flukes which live inside animals are not as conspicuous and thus less well known to most people. Finally there are many forms too small to be seen with-

out a microscope, these are known to most persons only by their names and the symptoms of the disease they produce. Malaria and coccidiosis are examples

The damage done by parasites varies. Some merely take part of the food normally intended for their hosts while others actually feed on living animal tissue. In general, parasites do little damage to the animals they infect and seldom are serious enough to kill their hosts. This is not too unreasonable, since many parasites cannot move to a new host and must die when their benefactor dies. The usual result of parasitic infections is a reduced vitality of infected animals.

Some parasites have two or more hosts—the larval stages occur in one and the

adult stage in another. Thus, humans may pick up parasites from eating partially cooked, infected beef and pork. **Fortunately there are no parasites known to occur in Montana which humans can acquire from eating deer meat.**

The parasites of deer can be grouped into the ectoparasites (those which live on the hide) and the endoparasites (those which live inside animals). There are a number of arthropods or insect-like animals which live among the hair of deer. **The deer keds or louse flies, *Lipoptena depressa* and *Neolipoptena ferrisi*** are probably the most commonly noticed parasites on hunter-killed animals. They, like similar forms on sheep, are commonly called ticks, but are actually true flies.

Deer keds are about 3/16 inch long and are brownish or grayish in color. They have an unusual life cycle. The females reproduce from about September to June. The fertilized egg is retained in the body of the female and hatches into a maggot which grows to about 1/4 the size of the female. When fully grown the maggot leaves the female's body and forms an oval, black pupal case about 1/8 inch long. These fall to the ground where they undergo a change resulting in the winged adult stage which emerges late in the summer. The adults fly about until they locate a deer and shortly afterward their wings break off.

Apparently these flies can live only on deer. The keds pierce the hide of deer with their mouth parts and suck blood. They probably feed several times a day for the rest of their lives of some three to nine months. The number of keds on a deer varies from area to area and from season to season. Apparently these differences are a reflection of the survival of the pupae during the winter. Although a deer may carry over a thousand keds they apparently are never a direct cause of death but their feeding must cause considerable irritation.

The lice on deer are smaller than louse flies and are not known to cause serious damage. **There are two species of biting lice** or Mallophaga of white-tailed deer—***Damalinia (Tricholipeurus) lipeuroides* and *D. parallelus***. Similar forms are found on the mule deer. These insects are from 1/16 to 1/8 inch long and whitish with brown markings or tannish in color. They are usually found in the thin, white hair along the abdomen. The young, which are similar to the adults but smaller, hatch from eggs attached to the hairs. Thus there are no stages which can live away from the host and deer become infected only by the movement from one animal to another during contact.

Biting lice feed on dead skin cells and do not actually suck blood, but their movements may bother the host.



Deer ked or louse-fly, *LIPOPTENA DEPRESSA*, a form often found on deer during the hunting season.



The biting louse of deer, **DAMALINA (TRICHOLOPEURUS) LIPEUROIDES**.

The sucking louse or Anoplura, *Solenopetes ferrisi* is rarely reported from North American deer. They are smaller than the biting lice and have a narrow pointed head which distinguishes them from the biting lice with heads about as broad as their abdomens. In our study this louse was found on only two deer—in both cases on the skin under the white hair of the rump. The Anoplura suck blood and lymph from the host and many species are harmful pests on livestock, but *S. ferrisi* has not been reported to occur in large numbers.

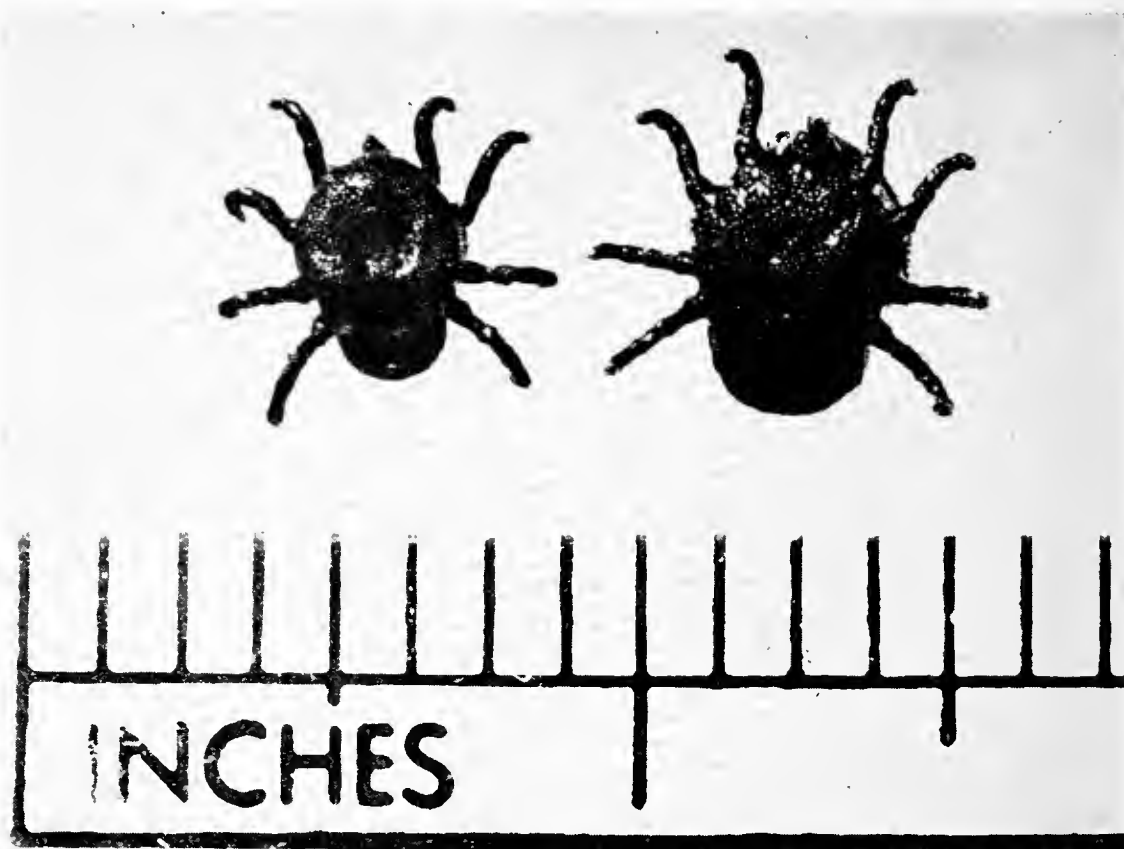
Two adult ticks are found during the spring of the year. These are *Dermacentor albipictus*, the winter tick, and *D. an-*



Male engorging female and female winter ticks, **DERMACENTOR ALBIPICTUS**, from the ear of a heavily infested deer.

dersoni, the spotted fever tick. Both of these also occur on other big game animals and on livestock. These ticks sometimes occur in large numbers and the blood sucked by engorging females during late winter and early spring is a serious drain on deer at a time when they are least able to afford it.

Dermacentor albipictus has only one host and thus the seed or larval and the nymphal stages are found on deer during the fall and winter. These stages are rather inconspicuous. The larva looks much like the adult tick but has only three pair of legs and is only about 1/64 inch long. The nymphal stage has four pairs of legs like the adult and is from 1/16 to 3/16 inch long. These stages often have their mouth parts embedded in the hide but may also be seen crawling on the hide or the hair.



Nymph stage of the spinose ear tick, *OTOBIUS MEGNINI*, from the ear canal.

A chigger, *Neoschongastia fullbergae* is even smaller than the seed tick but is relatively conspicuous because of its reddish-orange color. In this study, chiggers were found in the chest area. Little else is known about this parasite.

The nymph of the spinose ear tick *Otobius megnini* has been found in the ear canal of deer several times in Montana. Livestock also are infested with this form. During winter the nymph is about $\frac{1}{4}$ inch long and several of them in an ear undoubtedly interfere with hearing. The bloodsucking also causes ear damage.

Deer have nasal botflies related to the nose bot of sheep and the ox warbles in cattle. The deer bot, *Cephenomyia jellisoni*, has an inconspicuous first maggot stage which is less than $\frac{1}{16}$ inch long during the hunting season. These are found in the nasal regions of the head and

in the windpipe and are white with a pair of black hooks on the head. During the winter and spring they grow to a maggot more than an inch long which is usually attached near the back of the throat. In late spring the fully developed maggot crawls out of the nose and drops to the ground where it pupates. Metamorphosis (change in form of young to adult) is completed during the summer, probably in August and September, and the bumblebee-like adult fly emerges. This fly was once mistakenly reported to fly 600 miles per hour but it is now known to be a rather weak flier. Apparently the female fly lays larvae on the nose of the animal and these crawl back into the head and windpipe. Deer are said to be killed by more than about forty of the large maggots. Larger numbers of the earlier stages have been noted several times in deer from western Montana. This suggests that

some of our deer may die because of this fly every year. It is probably the most serious parasite of deer in western Montana.

There are a number of helminth or worm parasites in deer. Probably the most commonly encountered ones are the **bladderworms or larval stages of tapeworm which mature in dogs, coyotes and mountain lions.** The cysticercus stage of **Taenia hydatigena** is from $\frac{1}{2}$ inch to over 2 inches in diameter and is merely a sac of host tissue, with a fluid-filled, sac-like larval tapeworm inside. At one end of this larva, sometimes on a neck, is a solid mass of tissue which when ingested by a dog or coyote develops into an adult tapeworm about a foot long. Eggs of this tapeworm are in the droppings of the infected dogs and coyotes. Deer become infected by accidentally swallowing tapeworm eggs on contaminated vegetation. The cysts then develop in the tissue of the body cavity including the surface of the liver. A few of these bladderworms are harmless but massive infections may impair liver function, cause blockage of ducts, etc.

Another kind of bladderworm, about $\frac{1}{4}$ inch in diameter, is found in the lung tissue and apparently is the larval stages of **Taenia omissa** which matures in mountain lions. A third kind of cysticercus is that of **Taenia krabbi** which is from the size of a rice grain to that of a pea and is found in the muscles and heart. These mature in dogs and coyotes and are not known to infect humans. Since these stages are readily killed by freezing and by cooking there is no danger in eating infected meat. However, raw infected meat should not be fed to dogs.

There are several **adult tapeworms** that may live in the intestine of deer. **Moniezia benedeni** and **M. expansa** are broad tapeworms several feet long and the same species found in cattle and sheep. Animals become infected by swallowing grass mites containing the infective stages. **The fringed tapeworm, Thysanosoma actinoides,** is found in the small intestine and bile duct of deer and elk as well as in do-

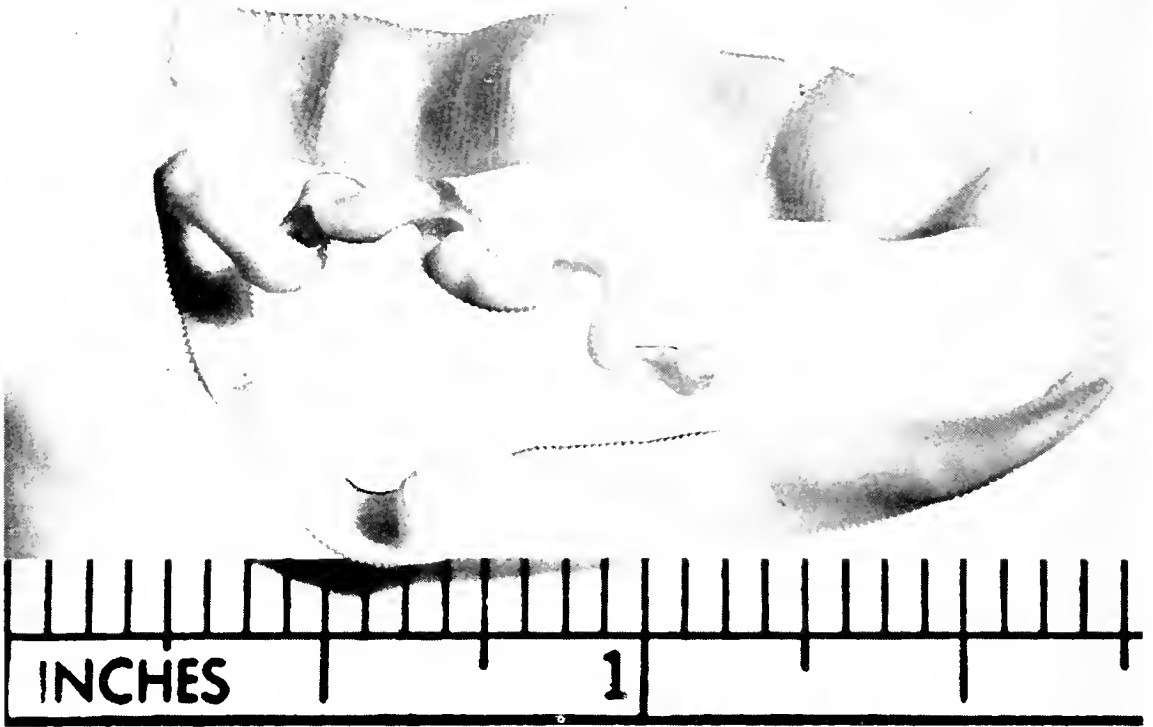


Almost completely developed maggots of the deer nose bot, **CEPHENOMYIA JELLISONI**, found in the throat of deer and elk in the late spring.

mestic sheep. These cestodes are several inches long and each proglottid or segment has a fringe of tissue giving the worm a furry appearance. The fringed tapeworm may cause partial blockage of the bile duct but **Moniezia** is believed to be relatively harmless.

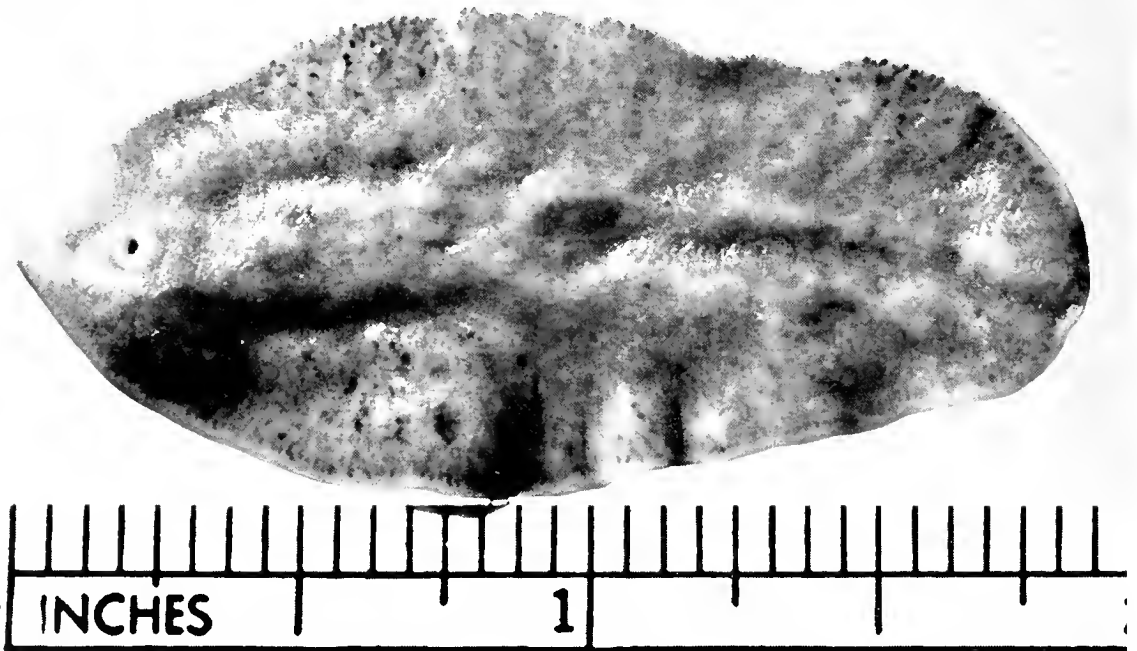
The **liver fluke of deer, Fascioloides magna,** is different from the common liver fluke of cattle and sheep, **Fasciola hepatica.** It is much larger, reaching two inches in length, and older flukes are often found in walled-off cysts projecting from the surface of the liver. Whitish cysts up to two inches in diameter were seen in this study. The blackish mass in the cysts is a mixture of fluke eggs and waste products.

The life cycle is similar to that of the cattle liver fluke. The parasite eggs leave the host in feces and must reach fairly clear water to continue the cycle. After several months of development a swimming stage emerges and actively seeks a



The fringed tapeworm of deer and sheep, *THYSANOSOMA ACTINOIDES*, which is often found in the bile duct.

FASCIOLOIDES MAGNA, the giant liver fluke, found in the bile ducts and in cyst-like pockets in the liver of big game species.



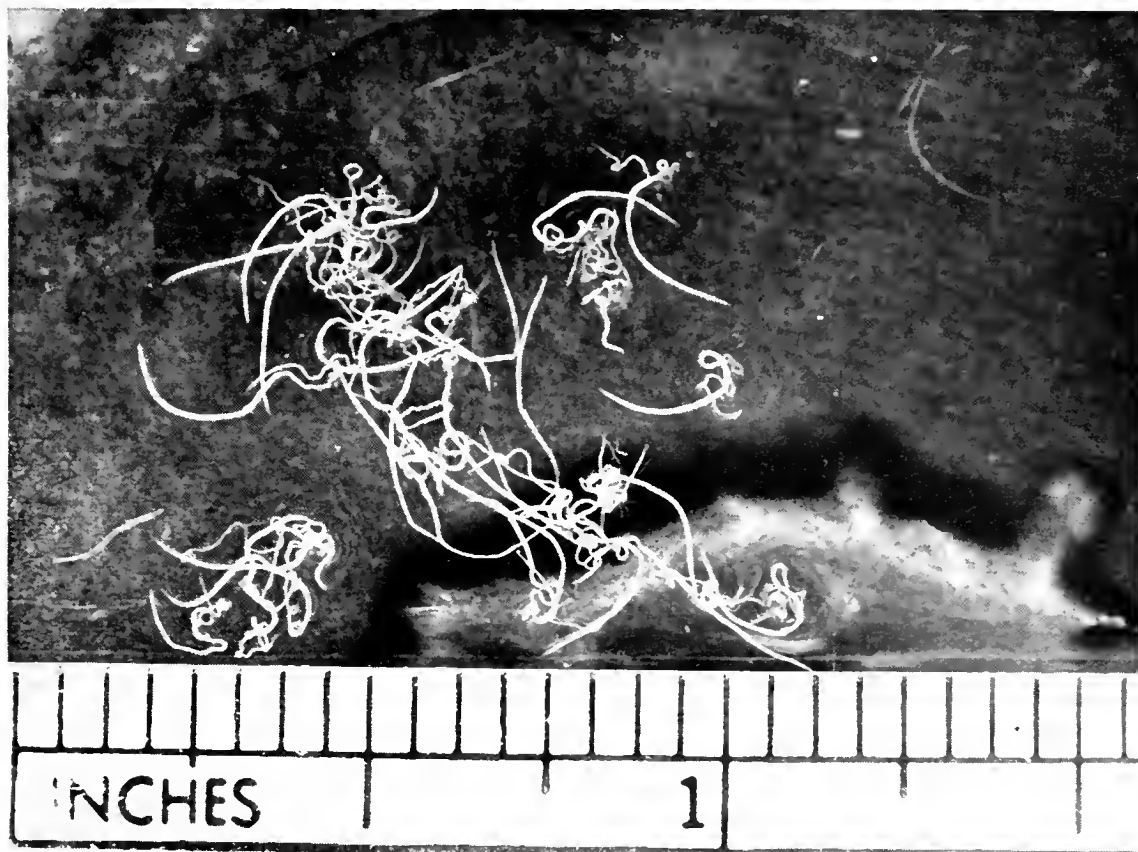
suitable pond snail. In the snail it undergoes additional development stages resulting in hundreds of another swimming stage which leave the snail and encyst on vegetation near the water surface. Deer and other animals become infected by eating this material. Livers infected with *F. magna* are probably safe to eat but not very appetizing. There is no damage to the rest of the animal and its meat is perfectly safe for human consumption.

Intestinal roundworms or nematodes do not seem to be as abundant in our deer as in our sheep and cattle, but this may be due to the limitations of the study.

A thread-necked worm, *Nematodirus* sp., was found in many deer in western Montana. This worm was unexpectedly found in animals of all ages. Related species in domestic sheep are usually abundant in young lambs and relatively scarce in older animals. Another roundworm, *Cooperia* sp., also related to cattle para-

sites was found in western Montana but not as often as *Nematodirus* sp. Both of these nematodes are picked up by the hosts on vegetation contaminated with infective larvae.

Legworms, *Wehrdickmansia cervipedis* or *Onchocerca cervipedis*. are very common in deer from some areas of Montana. These are thread-like worms about eight inches long which are found under the hide of the legs usually where the legs are removed by the hunter. Sometimes these worms become encysted and the cyst becomes filled with a pale greenish, solid mass. Apparently even large numbers of these worms are not especially detrimental to deer. The life cycle of these roundworms is not known but related forms have involved biting flies called blackflies or buffalo gnats. The larval stages are picked up by the flies near the site of the adult worms, undergo a period of development in the flies and re-enter the host near where a fly bites.



Thread-necked mematodes of the genus NEMATODIRUS from the intestine of deer.



WEHRDIKMANSI CERVIPEDIS, the legworm under the skin of a deer.

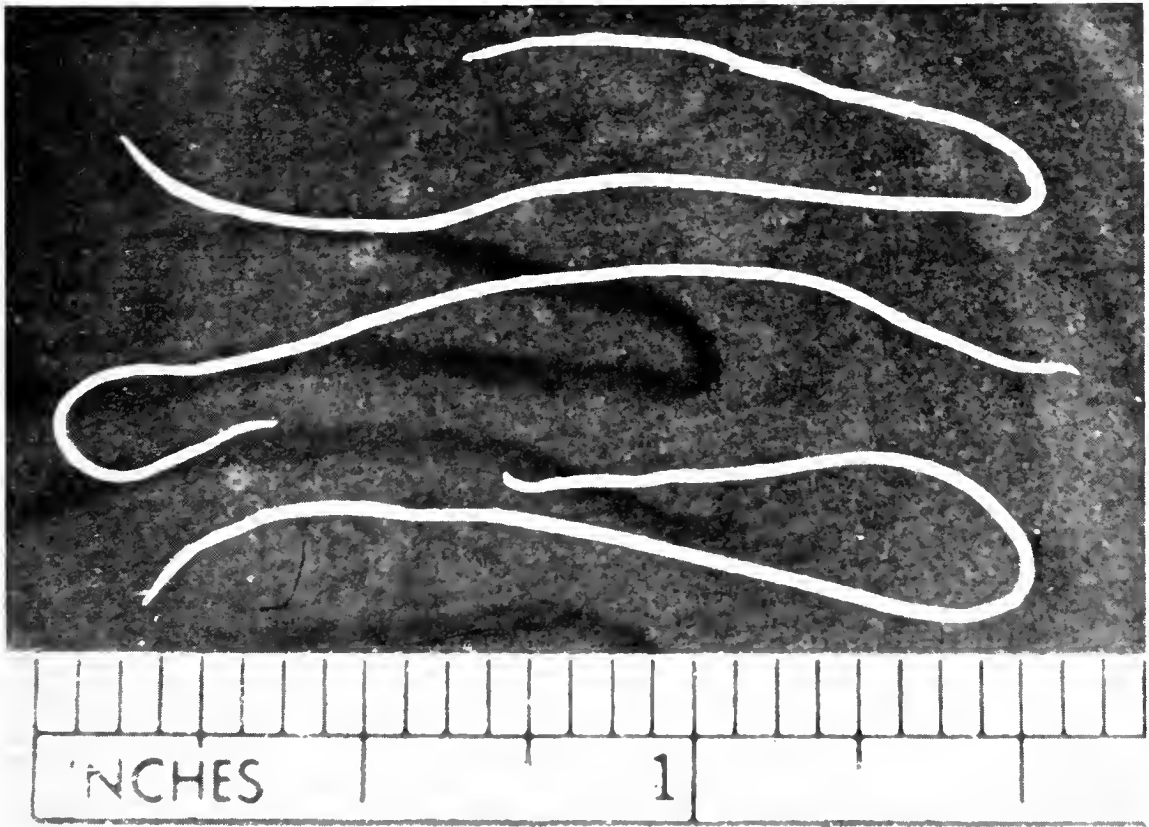
The few lungworms of deer encountered in our study are of the same species that occur in cattle and sheep. **Dictyocaulus viviparus** has been noted in several deer and has a direct life cycle; that is the larvae become infective on the ground and are accidentally ingested along with vegetation.

Another nematode is known to be present in our deer but we have not located the adults. The larval stages are found in the lungs and droppings of the animals. The adults are probably in the blood vessels or muscle of the host. Their importance is unknown at present.

Abcesses from $\frac{1}{4}$ to several inches in diameter are frequently found in deer. They are filled with a creamy or cheesy material and are in many cases produced by a bacterium of the genus **Corynebacterium**. In many cases these "pus pockets" are superficial and the meat can be utilized after the cysts and some surround-

ing meat has been cut out. In cases where there are many of these cysts and where they are deeper in the tissue it is probably best to have the animal checked by a veterinarian and reported to personnel of the Fish and Game Department.

Although we now have a fair idea of what parasites are present in our deer, we still have relatively little information as to how detrimental they are to deer. In general, helminth and arthropod parasites do not directly kill their hosts but merely reduce their vitality. This leaves infected animals more susceptible to such factors as predation and starvation. Also in general, parasites become more abundant and thus more significant as the numbers of animals in a given area increase. Thus parasites are more important among domesticated animals such as cattle and sheep, particularly in over-grazed and crowded areas than with comparable wild species. This is one argument for



DICTYOCAULUS VIVIPARUS, a lungworm in livestock, and big game animals.

maintaining deer populations below the level that might seem desirable to some persons. If the deer numbers were greater, parasitic diseases would probably in-

crease both in frequency and severity and contribute to a general decline in vigor of the animals and perhaps cause mass die-offs during hard winters.

A MONTANAN ON KATMAI

by
BOB COONEY, CHIEF
Division of Recreation and Lands Development
Montana Fish and Game Department
Photos By Author

HOW lucky can a person be? For three weeks this fall I had been on loan to the National Park Service working with a six-man study team in Katmai National Monument. We found it to be an exceptionally beautiful and remote area lying at the base of the Alaska peninsula, just south of the Bering Sea. The monument contains a variety of scenic beauty—a colorful, sand-filled valley; volcanic, ice and snow-capped mountains of the Aleutian Range; large inland lakes; and a hundred miles of rugged coast line. The area, lying two hundred miles southwest of Anchorage, is somewhat over two and one-half million acres in size. This makes it the largest, and presently the most remote unit under Park Service jurisdiction.

Our assignment was to explore as completely as possible in the time allowed, this yet little-known area and develop recommendations for its future management. My most vivid impression, and I know it was shared by the other members of the team, was that of its wild, exciting character.

Why it Was Set Aside

We found that Katmai had been set aside as a national monument in 1918. The primary purpose was to protect a strange and awesome region characterized by vast volcanic activity. There tremendous eruptive forces materially changed the landscape in the spring of 1912. At that time Katmai Volcano caved in creating a huge crater, which presently contains a beautiful lake. A flow of incandescent sand of almost unbelievable volume swept out onto a nearby valley, leaving it a stark dead region, shrouded by shifting clouds of steam. Explorers of the area fittingly called it "The Valley of Ten Thousand Smokes." A major region of beautiful lakes was added later, primarily to protect the great Alaska brown bear and other typical wildlife of the area. A final

addition brought the monument up to its present size by including the rocky picturesque islands along its rugged coast line.

The Big Bears

From a wildlife standpoint, I was very impressed with the Alaska brown bear. We were aware of their presence from the first moment that we stepped ashore from the amphibious plane that brought us into the monument from King Salmon. There on a sandy beach of Brooks Lake were bear tracks that far exceeded in size, anything I had ever seen and I couldn't help but recall that these were the largest bear on earth. We hiked for about a mile on a little trail along the edge of the Brooks River to our camp. I felt a bit uneasy as we noticed places along the



Kukak Bay in the still of early morning with the crest of the Aleutian Range above. This is one of many beautiful fiord-like inlets along the hundred miles coast line of the monument.

river's edge where the high grass had been recently trampled down. Bits of salmon here and there indicated that the big bears had feasted. Bear trails frequently crossed ours. During the days that followed, we several times saw these big fellows on river bars and along the streams. The sockeye, or red salmon, were running, and the bears were attracted to this ready source of food.

On one occasion, Sig Olson and I got too close to one when we decided to try to see bears at night. It was no fault of a big bear, I suspect, that he almost ran over us in trying to get away from an even bigger bear that was chasing him out of his fishing territory.

One afternoon a little later, I was watching a "brownie" fishing just across the Brooks River. Gulls were circling about him as near as they dared. I was fairly well concealed in the tall grass. He

would swim and wade along the river's edge. Every now and then he would put his head down under the water. He would occasionally make a lunge and several times came up with a red salmon in his jaws. I recall the first time I saw him catch one. He then stood up in three or four feet of water and laid the fish in the crook of his arm. He tore off bits of it with apparent relish. I know that he must have realized I was near, as a light breeze was blowing across the little river from me to him. Once he stood up and sniffed thoughtfully. I began to look about for the best retreat to some nearby scrubby spruce trees. He went on with his fishing, however. I couldn't help but feel that the big brown bear of the Alaska coastal areas, unless startled at close range, protecting cubs or wounded, is perhaps a little more relaxed in his relationship with people than our grizzly of the Rockies.



An Alaskan brown bear fishing for salmon along the edge of the Brooks River.

Other Game and Sport Fish

The gigantic Alaska moose is also a resident of Katmai. We saw them in the swamp areas near the lakes and scattered here and there in the low-growing white spruce and birch thickets of the valleys. The inner surfaces of their antlers, polished for the fall rut, gleamed in the sunlight. Caribou had been absent for a number of years, but seemed to be moving back toward the monument from nearby ranges. We were most anxious to see wolves, but were not fortunate enough to even hear them howl during our stay, although we saw tracks and knew they were there.

The monument is widely recognized for its sport fishing. Rainbow trout up to six or seven pounds, and even larger, have been the greatest drawing card. Fishing in Brooks River is restricted to the use of flies. One of these oversized rainbows in the cold water of the river on light tackle can do things that are long remembered. The lake trout, Dolly Varden, Arc-

tic Char, Northern Pike, and Grayling, as well as several species of salmon, add variety to fishing in these waters.

The Valley

From a scenic and impact standpoint, the Valley of Ten Thousand Smokes, and surrounding volcanoes presented the greatest thrill. I will not soon forget hiking up through this great valley. The glowing, hot sandflow of 1912 had covered this once lush green area to an average depth of one hundred feet. Two drainages flow through the valley, the Lethe River (named for a mythical river in Hades) and the Knife. These are strange rivers.



Looking up the sand choked Valley of Ten Thousand Smokes and the fog-draped base of Katmai in the middle distance
Volcano to

They have cut deep into the packed sand of the valley floor. In places, these rivers are only a few feet across on the surface but fifty or more in depth. You can hear the rumble of water far below. They could present somewhat of a hazard if one should venture too close.

The valley is colorful. Mineral stains of reds and yellows are evident. Pumice rock was blown out on the valley floor during the eruption. Some of it now floats in bobbing rafts on a nearby lake where it has been washed out of the valley.

I was caught with the stark lonely beauty of this volcanic region. I can recall being impelled to hike as far as time

would allow toward the still active fumaroles of the upper valley and the great steaming vent of Trident Volcano. Part way up the valley I reached an island of willow growth that had established itself somehow on the otherwise bare sand of the valley floor. A flock of ptarmigan burst from this little oasis. They were partially white and made a beautiful splash of life and color in this otherwise almost lifeless section of the monument.

The Coast Line

We spent several days cruising the rugged coast line of the monument in a research vessel. Few people have as yet visited the uncharted bays of this magnificent section. An undisturbed Alaska brown bear and her three cubs early one morning on a sandy beach seemed to typify the remoteness of the area. Snow and ice-capped mountains rose abruptly up from the alder-cloaked shore line. Sea lions plunged into the surf from several rocky islets as we cruised past. Harbor seals and a rare sea otter gazed for a moment at us before quietly submerging. Shearwaters, like miniature albatrosses, rode the upcurrents of air among the waves of the Shelikof Strait. The little kiddiewake gulls sailed nearby and every now and then plunged into the sea with all the vim of our familiar kingfisher.

A Hope for the Future

As our ship turned back across the strait toward Kodiak Island and home, I know we were all struck with the same thought — We had experienced the rare privilege of spending nearly three weeks in one of the most truly wild remote areas left on the North American Continent. Just how this beautiful and most exciting place, presently quite difficult of access, can be enjoyed in future years without endangering its precious wild character will be worthy of the finest possible planning. We hoped, I am sure, that at least in a small way, our findings and suggestions would be helpful in working out such a program.



akes. The deeply gashed Knife River in the foreground steam mingling with clouds from the still active Trident volcano is right.



MONTANA MAMMALS

The following list of Montana Mammals was prepared by Dr. Philip Wright, Chairman of the Department of Zoology, Montana State University. It is reprinted here, by permission, from the 1959-60 Montana Almanac.

Slight revisions from the Almanac have been made by Dr. Wright in order to make the listing current.

"The Montana State University Zoology Department maintains a collection of over 5,000 mammal skins and skulls. This includes specimens of all but two of the species listed for Montana. The staff would be happy to identify rare mammals sent in by interested residents and would appreciate donations of any of the species indicated as rare."

The big game hunter, venturing for the first time since last autumn into Montana's high country, is perplexed upon seeing a little creature that resembles a mountain rat with bobbed tail. Another hunter curiously kicks at low dirt mounds scattered about a meadow and wrongly muses that this is the doings of a mole.

The nature of many mammals is such that most of us never become familiar with even those that share our own environment. Night-flying bats, the hungry

little shrew, the pika stacking hay in his rocky retreat are examples of not commonly seen animals.

Man himself is a mammal; consequently, he has much in common with the other mammal members. All mammals have similarities that set them off from the rest of the animal world. Among other things they all possess hair; nails, claws or hooves; they are warm-blooded; the young are suckled and live birth is given to the young.

MONTANA MAMMALS

LEGEND — Classified According to Montana Law

G Game Animal	P Predatory Animal	F Furbearer
Common Name	Scientific Name	Distribution and Occurrence
Masked Shrew.....	<i>Sorex cinereus</i>	Dry woods, throughout the state.
Vagrant Shrew.....	<i>Sorex vagrans</i>	Moist woods and meadows in western portion, common.
Marriam Shrew.....	<i>Sorex merriami</i>	Sagebrush and grasslands in eastern counties, quite rare.
Dwarf Shrew.....	<i>Sorex nanus</i>	Known from several high mountain ranges in the center of the state.
Northern Water Shrew.....	<i>Sorex palustris</i>	Banks of fast streams and shores of high altitude lakes in mountains.
Pigmy Shrew.....	<i>Microsorex hoyi</i>	Dry woods of northwestern Montana only, rare.
Little Brown Bat.....	<i>Myotis lucifugus</i>	Throughout the state, common.
Yuma Bat.....	<i>Myotis yumanensis</i>	Throughout the state, less common than above.
Little Long-eared Bat.....	<i>Myotis evotis</i>	Throughout the state, fairly common.
California Brown Bat.....	<i>Myotis californicus</i>	Known from Ravalli county.
Long-legged Bat.....	<i>Myotis volans</i>	Higher elevations in western half of the state.
Say Bat.....	<i>Myotis subulatus</i>	Most of the state.
Big Brown Bat.....	<i>Eptesicus fuscus</i>	Throughout the state, may hibernate in buildings during winter.
Red Bat.....	<i>Lasiurus borealis</i>	Eastern portion of the state.
Hoary Bat.....	<i>Lasiurus cinereus</i>	Deep woods in summer, probably occurs throughout the state in migration.
Spotted Bat.....	<i>Euderma maculata</i>	Known only from single specimen obtained at Billings.
Towsend's Big-eared Bat.....	<i>Plecotus townsendii</i>	Known from several caves and mines in central and western Montana.
Silver-haired Bat.....	<i>Lasionycteris noctivagans</i>	Wood areas, rather common.
G—Black Bear.....	<i>Ursus americanus</i>	Forested areas, rather common.
G—Grizzly Bear.....	<i>Ursus arctos</i>	Remote wilderness areas especially at high elevations, rare.
F—Fisher.....	<i>Martes pennanti</i>	Extremely rare or extinct; a number of animals have been transplanted into western Montana from central British Columbia.
F—Marten.....	<i>Martes americana</i>	Most higher mountain regions, common.
P—Short-tailed Weasel.....	<i>Mustela erminea</i>	Generally in forested areas, common.
P—Long-tailed Weasel.....	<i>Mustela frenata</i>	Throughout the state, common.
P—Least Weasel.....	<i>Mustela rixosa</i>	Eastern half of the state, rare.
F—Mink.....	<i>Mustela vison</i>	Marsh areas and stream banks throughout the state, common.
F—Black-footed Ferret.....	<i>Mustela nigripes</i>	Eastern part of the state in prairie dog colonies, extremely rare.
P—Wolverine.....	<i>Gulo gulo</i>	Wilder portions of western mountains, rather rare.
P—Striped Skunk.....	<i>Mephitis mephitis</i>	Throughout the state in farm land and open country, common.
P—Spotted Skunk.....	<i>Spilogale putorius</i>	Known only from two specimens obtained in Ravalli county.
Badger.....	<i>Taxidea taxus</i>	Throughout the state, common.

F—Otter	<i>Lutra canadensis</i>	On large streams, mostly in western portion, rare.
Raccoon	<i>Procyon lotor</i>	Recent invader from both east and west, now common in large river valleys throughout the state.
Red Fox	<i>Vulpes vulpes</i>	Formerly rare throughout the state but now fairly common in many areas.
Kit Fox	<i>Vulpes velox</i>	Originally common in eastern counties, now probably extinct.
P—Coyote	<i>Canis latrans</i>	Throughout the state common.
P—Timber Wolf	<i>Canis lupus</i>	Originally present throughout the state, now confined to Glacier National Park and vicinity, rare.
P—Cougar	<i>Felis concolor</i>	Western counties, rare.
F—Canada Lynx	<i>Lynx canadensis</i>	Heavily forested areas in western part of state, rare.
P—Bobcat	<i>Lynx rufus</i>	In many areas in state, common.
Golden-mantled Marmot	<i>Marmota flaviventris</i>	Rocky areas and mountains of most of the western part of the state, common.
Hoary Marmot	<i>Marmota caligata</i>	Above timberline in Glacier National Park and neighboring high mountain ranges, rare.
Columbia Ground Squirrel	<i>Citellus columbianus</i>	Western one-third of the state, common.
Richardson Ground Squirrel	<i>Citellus richardsonii</i>	Eastern two-thirds of the state, common.
Uinta Ground Squirrel	<i>Citellus armatus</i>	Yellowstone Park and surrounding areas, common.
Thirteen-line Ground Squirrel	<i>Citellus tridecemlineatus</i>	Grassland in eastern and central areas.
Mantled Ground Squirrel	<i>Citellus lateralis</i>	Rocky areas in the mountains of central and western regions, common.
Black-tailed Prairie Dog	<i>Cynomys ludovicianus</i>	Formerly abundant in eastern Montana, now much reduced by poisoning.
White-tailed Prairie Dog	<i>Cynomys leucurus</i>	Known only in Carbon county.
Least Chipmunk	<i>Eutamias minimus</i>	Primarily in sagebrush areas in eastern and central Montana, common.
Yellow Pine Chipmunk	<i>Eutamias amoenus</i>	Lower elevations in western Montana, common.
Rufous-tailed Chipmunk	<i>Eutamias ruficaudus</i>	Higher elevation in northwestern mountains, common.
Uinta Chipmunk	<i>Eutamias umbrinus</i>	Higher elevations in the vicinity of Yellowstone National Park.
Red or Pine Squirrel	<i>Eutamiasciurus hudsonicus</i>	Coniferous forest in western counties, common.
Northern Flying Squirrel	<i>Clauomys sabrinus</i>	Dense forest in western counties, common.
Northern Pocket Gopher	<i>Thomomys talpoides</i>	Throughout the state, common.
Wyoming Pocket Mouse	<i>Perognathus fasciatus</i>	Dry areas in eastern counties, rare.
Great Basin Pocket Mouse	<i>Perognathus parvus</i>	Known only from Beaverhead county.
F—Beaver	<i>Castor canadensis</i>	Along streams and lakes throughout the state, common.
Ord Kangaroo Rat	<i>Dipodomys ordii</i>	Sandy soil and sagebrush in the eastern half of the state.
Grasshopper Mouse	<i>Onychomys leucogaster</i>	Grasslands of eastern Montana.
Harvest Mouse	<i>Reithrodontomys megalotis</i>	Grasslands of eastern Montana.
Deer Mouse	<i>Peromyscus maniculatus</i>	Throughout the state in virtually all habitats, common.

White-footed Mouse.....	<i>Peromyscus leucopus</i>	Eastern Montana.
Bush-tailed Wood Rat.....	<i>Neotoma cinerea</i>	Deserted cabins in rocky mountain areas, common.
Northern Bog Lemming.....	<i>Synaptomys borealis</i>	Only in wet meadows of west side of Glacier National Park, rare.
Mountain Phenacomys.....	<i>Phenacomys intermedius</i>	Mostly near timberline in high mountain ranges.
Red-backed Mouse.....	<i>Clethrionomys gapperi</i>	Moist coniferous forests in western half of state, common.
Meadow Vole.....	<i>Microtus pennsylvanicus</i>	Wet meadows throughout the state, common.
Longtail Vole.....	<i>Microtus longicaudus</i>	Wet woods of central and western Montana, common.
Mountain Vole.....	<i>Microtus montanus</i>	Dry grasslands of western and central Montana, common.
Richardson Vole.....	<i>Microtus richardsoni</i>	Stream banks at high elevations in the mountains.
Prairie Vole.....	<i>Microtus ochrogaster</i>	Dry grasslands of eastern Montana, common.
Sagebrush Mouse.....	<i>Lagurus curtatus</i>	Sagebrush areas in eastern and central mountains, rare.
F—Muskrat.....	<i>Ondatra zibethica</i>	Ponds and streams throughout the state, common.
Rocky Mountain Jumping Mouse.....	<i>Zapus princeps</i>	High mountain meadows and wet woods near water in the western half of the state.
Prairie Jumping Mouse.....	<i>Zapus hudsonius</i>	Known only in southeast Montana.
House Mouse.....	<i>Mus musculus</i>	Around human habitations throughout the state, common.
Norway Rat.....	<i>Rattus norvegicus</i>	Known only in some of the cities.
Porcupine.....	<i>Erethizon dorsatum</i>	Throughout the state, common.
Pika.....	<i>Ochotona princeps</i>	Slide rock areas in higher mountains, common.
Snowshoe Rabbit.....	<i>Lepus americanus</i>	Forested areas in western half of the state, common.
White-tailed Jack Rabbit.....	<i>Lepus townsendii</i>	Open areas throughout the state, common.
Black-tailed Jack Rabbit.....	<i>Lepus californicus</i>	Known only in Grasshopper and adjacent drainages in Beaverhead County.
Mountain Cottontail.....	<i>Sylvilagus nuttallii</i>	Lower elevations in western Montana, common.
Desert Cottontail.....	<i>Sylvilagus auduboni</i>	Eastern counties, common
Pigmy Rabbit.....	<i>Sylvilagus idahoensis</i>	Known only in Grasshopper drainage in Beaverhead County.
G—Elk.....	<i>Cervus canadensis</i>	Certain suitable areas in central and western Montana, common.
G—White-tailed Deer.....	<i>Odocoileus virginianus</i>	Forested areas in western Montana and brushy river bottoms in eastern Montana, common.
G—Mule Deer.....	<i>Odocoileus hemionus</i>	Suitable habitats throughout the state, common.
G—Moose.....	<i>Alces alces</i>	Suitable areas in western half of the state, fairly common.
G—Woodland Caribou.....	<i>Rangifer tarandus</i>	Formerly occurred in Lincoln County, now enter the state from British Columbia, but only rarely and in winter.
G—Pronghorn Antelope.....	<i>Antilocapra americana</i>	Most of eastern and central Montana, common.
G—Bison.....	<i>Bison bison</i>	Formerly occurred throughout the state, now confined to Yellowstone National Park, the National Bison Range, and in scattered bands on private ranches.
G—Bighorn Sheep.....	<i>Ovis canadensis</i>	In scattered bands in the western half of the state, reintroduced into several mountain ranges.
G—Mountain Goat.....	<i>Oreamnos americanus</i>	High mountain ranges of northwestern Montana, successfully transplanted in several mountain ranges in central Montana.

LEISURE OUTDOORS

by

DR. ED DUGAN,
School of Journalism,
University of Montana



Outdoor recreation—leisure in all its forms—has come a long way in three hundred years. Work is still honorable, but idleness and purposeful leisure is not the sin that it was to our forebearers. Let's face it. We're emerging into a period (hopefully maturity) where a man's ability to consume leisure is some measure of his success.

And that's where recreation and natural resource agencies with their management programs and recreational architects and engineers must teach and manage people even as they are tagging bears. The family that uses our outdoor resources has the right to look to fish and game departments, parks, and other agencies for help along educational lines. The fish, game and parks departments have as much a parental as a management role.

While we're not, and likely wouldn't want to be a leisure class, we're threatened by the excess of leisure that will be heightened by quickening automation.

The situation isn't without its humor. We still feel a little guilty about playing. Hence we "save up" or have a savings

account of vacation time that we can draw on as having earned. We even give ourselves "snow jobs" that we've been working too hard and need that unscheduled trip up the Blackfoot. And there are all forms of specialized semi-vacations where at least the routine is broken for a spell.

Yet with all this "saving up," we pace ourselves in that we have been encouraged to "homogenize" our recreation—to sneak away for the long weekend, to put in for a few days in an off-season month, to save back a few days from summer for the hunting season. Turn back the years. That couldn't have been winked at 50 years ago—for the peasantry.

Figures don't stand still. At some point a recent guess-timation fixed late summer vacations at only 55 per cent of all formal times off. That doesn't count legislated coffee breaks, sanctioned convention trips and simply "out for the mail." Like the little old lady who didn't want the Boy Scout to hustle her across the street, maybe we're not recreationally prepared for the ZIP code age. The postoffice box has its virtues.



A list of types of camps is evidence of an evolving attitude toward more leisure, most of it out of doors. Youth hostels have a toehold on our continent. The physical and natural sciences sponsor summer camps. Religious groups sponsor summer camps and retreats. Adults have leadership camps. Municipal camps, public school camps, industrial sanctuaries, Union resorts, work and rehabilitation camps—and just plain family camping—seem all to be on the increase. And because much of the acreage in this neck of the woods is under some resources agency, plans for access, development, and preservation are delicate operations. From the ashes, scarcely cool, of the old tourist camp and tenting tonight on the old mill stream, has risen the Phoenix of camps aplenty. Take your pick.

There's the delicate balance between an agency's plans for picnic and camping areas where private operators and concessionaires seek to provide the vacationers' creature comforts. Some feel that such agencies might content themselves with the more primitive needs. Yet short seasons, high initial costs of water service, waste disposal, etc., don't always invite private capital. All this must be weighed in the light of the overnight destruction of a \$1200 flush toilet by vandals.

Thus resource agency information programs must tell the story of problems and trends even as they are teaching teenagers how to hunt and their parents, most of them were born in another state, how to face up to problems that may never have confronted them before.

What's a family going to think about pros and cons of easing their new boat with high-powered outboard down the ramp or off the beach of a once quiet mountain lake? It's not easy to put lakes off limits to the water skiers who feel that they are equally owners. The no-wake solution seems to be gaining support. But it takes lots of educating. Mention water to management agencies and they raise problems of water levels, draw downs, and access to waterfronts and marinas. It's not unusual for a recreation program to provide camps, ramps, and docks—with management of the water understandably under authority for flood or crop use.

A person who writes as a user of recreational resources can present problems without a publicity label. As a tip to I&E men, we peasants and great unwashed appreciate help and explanations, but we don't want agency commercials woven into every paragraph.

People won't wear tags to record migrations as do bears and birds, but work and play habits are undergoing such change that outdoor recreation men can't manage game without knowing about people.

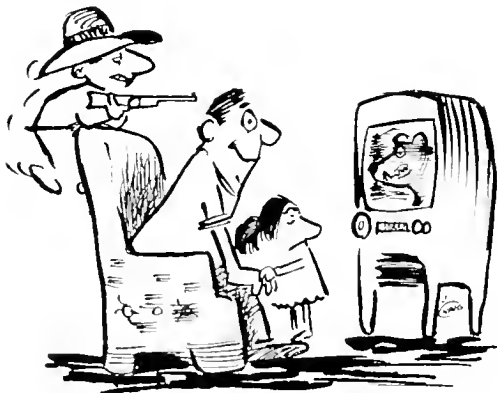
Sportsmen, especially urban dwellers, seem to be seeking our hinterlands and outbacks for reasons that need recognition. About 70 per cent of us are squeezed into about 6,000 urban places. Meat on the table, fish in the creel aren't real issues in the over-all picture. It's escape, an attempt to prove something, to survive under adequate but pseudo frontier conditions—even if hot showers and trailer park power are free or coin operated.



The aesthetic angle, and more difficult to explain, is none the less real. It figures importantly in public relations values. There are the somewhat mystic qualities of forests and tall timber, the vertical awe and even vague fright that being hemmed in arouses. The effect carries religious implications. Photographers can accent the vertical in a picture for the psychological effect.

To give the plainsman his "day in court," I&E people are well aware that wide open spaces carry a "this is my home, my native land" feel. Rolling grasslands are the open palms of neighborliness, born of being widely separated and unprotected. You get the vastness about which Mari Sandoz has written so well in her "Old Jules" and other books.

Kissin' cousin to the aesthetic value is the off-season or armchair need that consumers feel for natural resource information. Historically men had to bestir themselves and to provide victuals for their families, even at the risk of cooling their backsides. It's not necessary now, but it's vestigial. To feel secure indoors and yet to see the pictures and reports on how game is wintering and how deep is the snow at Indian Lookout satisfy the reader. He has ventured afield without getting out of his chair. Likely it's a little like the dog that paws at his cast-off blanket to scratch himself a place to bed down for the night.



The year-round job of helping readers toward more satisfying recreation allows fish and game departments to ease information into sportsmen's minds when they have time to weigh and absorb them. If all conservation issues were aired at the height of tensions, the educational gains would be disappointingly limited.

Perhaps by way of suggesting off-season I&E, some writers have construed this return to nature as a seeking for meaning in a changing world where old traditions and close family ties may have gone by the boards. Maybe we need I&E help in use of recreational resources where age or different living conditions have made us strangers perhaps even to one another.

There's no doubt that after Labor Day the traffic in parks runs heavily to childless couples and persons in early retirement—who seem to be renewing at leisure their love of one another—and just happen to have pictures in their hand bags or billfolds of their grandchildren—if an unwary fellow tourist ventures within earshot. Statistics indicate that about one third of a person's life will be lived after the youngest of his children marries and leaves the parental roof. That's a challenge for recreation planners. While older persons like to live well, most of their material curiosities have been satisfied. Vista points, scenic and historic signs, and interpretative programs draw well. At their ages they don't object to admitting that they don't know everything.

That "secret" ingredient in vacationing—education—is being met for both old and young through the various visitor information that was once a parent's responsibility. And in a strange situation a young parent can be eternally grateful to a guide, a self-guide leaflet, or a naturalist's fire-side talk for protecting parental ignorance. Such obvious aids as instructions and pictures on dressing out meat, picking a duck, and skinning a rabbit were contained in a current issue of a fish and game magazine. An eastern state issues publications on how to recognize animals, snakes, and birds that are native to that

state. A western state distributes pamphlets to hotel and motels to alert passers-by to problems of game management, winter range, and game and fish plants.

Commercial enterprises have been quick to capture the education factor or rationalization. Marineland, Disneyland, world's fairs, and science exhibits are almost hypnotic in their appeals. Trips, such as to fairs, are almost "required." Advertising pictures happy families in "play and learn" situations, with parents quietly proud that they are doing what's right by their offspring. One club begged parents to turn out for a play night lest the program fail and the club be disgraced.

No appraisal of outdoor recreation could be complete without viewing certain possessions and experiences in the light of status symbols. While the do-it-yourself exertions of cookouts, campouts, and adult athletics even have political

overtones, there's no denying that some physical exertion is socially acceptable. Again it may, sans war and insecurity, supersede the fight for survival, the classic fight and move onward course of peoples.

A reader could work himself into anguish over exploding populations, bumper-to-bumper touring, excess leisure, loss of habitat and range capacity. It's true that the population per square mile is about 100 in the corn belt, 240 in the Northeast, up to 795 in Rhode Island. But it's 2 in Nevada, and 4 in Montana. Montana has about 21 per cent of its land in recreational capacities. Whereas in 1850 each person had 82.6 acres of elbow room, it will drop to 8.4 by 1976, the recently completed inventory of outdoor recreational resources reports. The Northwest is the obvious depository, the largest stockpile of outdoor recreation in the most readily reached part of the United States.



The northwest is the largest stockpile of outdoor recreation in the most readily reached part of the United States.

Photo—R. Cooney

The off-season satisfactions and the aesthetic values in nature, to which references have been made, likely will become more important as this homogenized leisure increases. Personnel management and internal public relations programs heighten fringe benefits and rate consumption of leisure as important in training programs. One corporation has underwritten employees' hobby costs in some remote areas. Another carries pictures in its company publication of successful hunters, record catches, and winning golfers—employees all.

Credit certainly goes to consumer magazines for giving natural resource agencies assistance, in season and out of season. While readers get a lot of vicarious enjoyment, and the Walter Mittys ride off to the kill, common sense help in how-to-do-it articles slips into the working knowledge of thousands of sportsmen.

Without knowing the exact titles of conservation pieces in such magazines, the circulations as recently records in Montana give respectable evidence of their influences. Boys' Life has 12,344 subscribers in Montana, Outdoor Life, 13,705; Field and Stream, 7,593; and Holiday, with a recent issue concentrating on our part of the country, 3,009.

Of a more specialized nature, the famous National Geographic Magazine has

12,887 in Montana, and an even more specialized magazine, as American Rifleman, sports 5,331. Guns and Gun World each has more than a thousand.

That reckons without the conservation assistance given the field by the circulation giants in the magazine field. Readers Digest with its 66,000, Family Circle with 34,000 offer both information in the form of strong editorial direction and aids in out-of-doors living.

Credit for assists could go on indefinitely. The fraternal orders, publications of associations and so-called pressure groups, and local newspapers are not unmindful of the problems of outdoor recreation. The total impact is good. As most I&E staffs agree, basic conservations rides into minds on the backs of controversy. However readers might have felt and feel about the Yellowstone elk reduction, thousands understand the problems of management, range, browse, experimental exclosures, etc., than ever before.

More leisure, the problems of providing for more facilities of the kind the vacationer wants, and the understanding of why he wants and how he's going to use them constitute a major concern for natural resource agencies. Brunt of the job falls on the Education and Information divisions. It's a primary educational role at the family and community level.

An entire issue of the October, 1963 Journal of Wildlife Management will be devoted to the grouse of North America. This book will be loaded with up-to-the-minute information, studies, and management techniques of these fine game birds. The symposium is, in essence, a review of modern knowledge useful in the management of North American grouse.

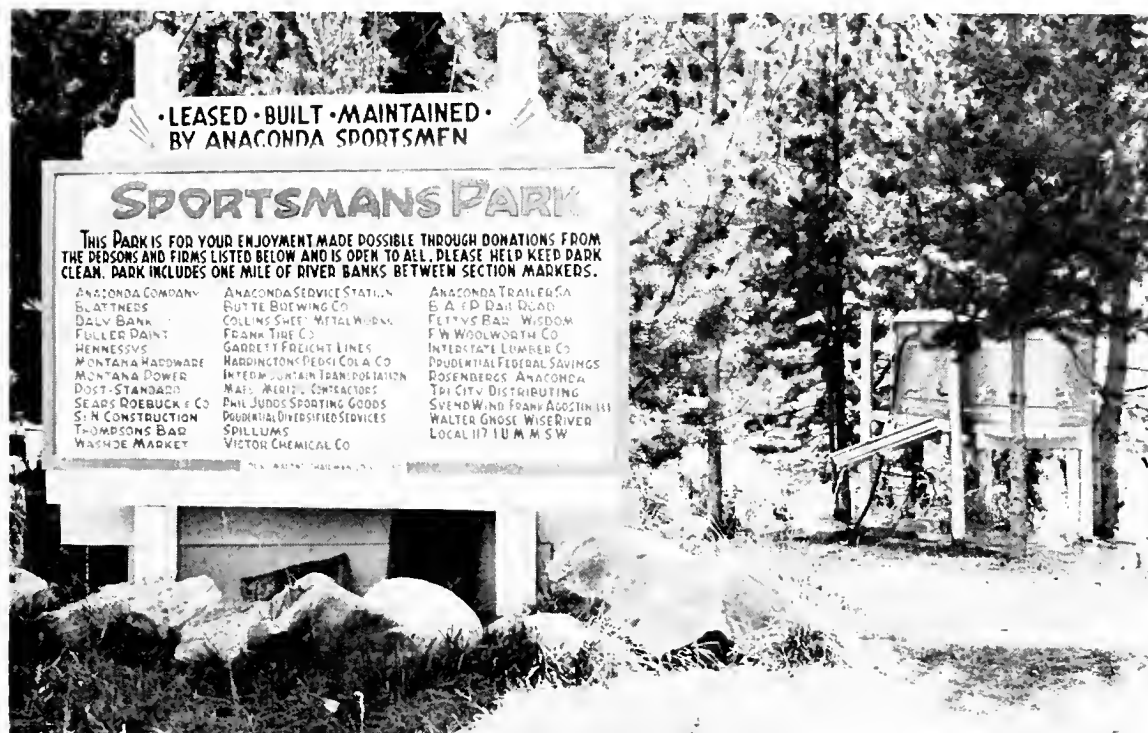
The issue will run about 370 pages and will be liberally illustrated. The cost of this symposium number during the current year will be \$2.50 each. After the first of the year, the cost will go to \$3.00.

Orders should be placed with Dr. Fred G. Evenden, the Wildlife Society, Suite 615, 2000 P. Street, N.W., Washington, D.C. 20036.

In introducing the publication, Thomas G. Scott, Department of Fish and Game Management, Oregon State University, points out some important facts. Certain races are endangered, at least locally, primarily as a consequence of public apathy, for grouse respond readily to management. Grouse provide an outstanding contribution to sport hunting, and their esthetic value should not be underrated.

Anaconda Sportsmen's Project

PHOTOS BY STEVE BAYLESS



Comes springtime and masses of Americans flock to the country. Campers and trailers move onto highways for continent-spanning trips, other voyagers pack up tenting gear for a week's outing, and on the local front fishermen and family picnickers make ready for a day of outdoor fun. Whether out for the summer or just for the day, these travelers have one thing in common—they are looking for places to stay. They are looking for clean, attractive campgrounds—with drinking water, fireplaces, tables, and toilets.

State and federal agencies have not been able to keep up with the growing need for such recreation areas, and help from individuals and groups is more than welcome. The Anaconda Sportsmen's Club is one group that is doing its part in providing well-planned camping and picnicking facilities.

In 1960 the Anaconda Club began construction of a badly needed campground along the Big Hole River some thirty miles southwest of Anaconda on Highway 43. The Big Hole provides a scenic setting and the river is widely known for its excellent trout fishing. The site is a popular camping and picnic spot for local people and out-of-staters as well, and is the only grounds of its kind with drinking water in the vicinity. The area includes a total of some 90 acres. Fifty acres are now in use on the northeast side of the river, and forty acres on the opposite side are included in future development plans.

The cost of leasing land for the grounds is paid by donations from people using the campground and from memberships in the club. A number of picnic tables, outdoor fireplaces, and six outdoor toilets were constructed with donated labor and



Fireplaces and picnic tables are provided at Sportsman's Park.

materials from people of Anaconda, Butte, Philipsburg, Deer Lodge, Wise River, Wisdom, and Jackson. Total cost of the project to September 6, 1963 was \$710.92. The club has received \$523.25 cash donations, not including materials.

Long range development plans, according to Ray Fischer, secretary for the club,

includes the possibility of a sportsmen's lodge for club members. Also, the club hopes to construct a playground for children and a bridge to additional facilities planned across the river.

The Anaconda Sportsmen's Association is to be congratulated for this far-sighted boost to Montana's recreation programs.



The Big Hole River provides a scenic setting for Sportsman's Park.

THE INDIAN HUNTER

By VERNON CRAIG



This photo is a portion of a Montana Historical Museum diorama depicting a buffalo jump. Photo by V. Craig.

Time has hidden most of them now—the tons of crumbling bones that once were buffalo driven over a cliff. Yet here and there some telltale fragments of bone, or row of rocks, or dredging stream reveals where the big kills were made.

These pishkuns, or jumps as they are called, must have been an awesome yet exciting jumble of confusion with grunting, bellowing, terrified bison, the half wild cries of Indians, all muffled by the thunder of heavy hooves. Even before the last shaggy body plummeted from the cliff, a line of braves and boys began thumping arrows into broken, but still

living animals. Clouds of dust mingled with the hot, greasy smell of fresh blood and entrails as squaws got to the job of cutting up the still warm carcasses. The pishkun was but one of a great variety of methods employed by aboriginal Indians, and even this was practiced with several variations.

In nearly all forms of hunting during historical times, the bow and arrow was used almost universally. The earliest projectile points were not for arrows, but appear to be spear points. In the old world, bows are known to have been in use about 7,000 BC and possibly before, but in North

America their appearance was much later. It was about AD 500 that stone points similar in size and workmanship of modern arrowheads became common. Undoubtedly, before the appearance of stone points earlier piercing weapons of sharp sticks and bones were used. But the use of stone points dates back a long way. Some points were found near the skull of a mammoth near Clovis, New Mexico, and other artifacts have been found with remains of extinct species of bison, wild horses, and camels.

It is believed by many that North American Indians are of Mongolian ancestry and probably emigrated to this continent from Siberia. It is believed also that they first appeared here after the last of the great ice sheets was melting and retreating to the north. Historically, it's difficult to point out a section of Montana as being characterized by any one Indian tribe. Tribal movements, unions, and splits were common. Probably a large part of tribal moves were directly or indirectly caused by white men. The introduction of firearms and horses, the destruction of native game herds all had their effects. In historical days at least, Algonquins held most of the country east of the Mississippi. Blackfoot, Piegan, Blood, Atsina (Gros Ventre) Arapaho and Cheyenne were among the some 100 tribes belonging to the Algonquins, and it was from their ranks that many Montana Indians originated.

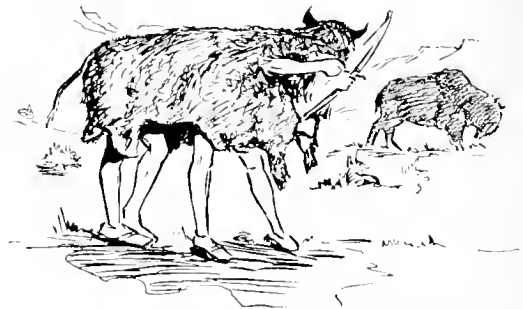
A variety of small animals and plants formed a staple part of the diet for most Indian tribes, but in historical times and probably long before, bison were the main source of food for redmen between the Mississippi and the Rockies. Smaller game was taken mostly for hides, horns, and antlers. The hides of mountain sheep and antelope were prized especially for dress clothing, and sheep horns were fashioned into ladles for various uses. Wolves and coyotes were caught in baited pits or deadfalls, and smaller animals were taken with snares and deadfalls. An occasional grizzly was killed, mostly for its claws, but all

excepting the most brave Indians feared the big brutes and left them alone.

Birds were taken too, but by far the most prized birds were the golden eagles. Feathers and talons of the golden eagles were much prized for head-dress and ritualistic gear. It took a great deal of time and patience to capture an eagle. One method was to dig a pit on an open hill. The hunter would then cover it carefully with sticks, straw, and some earth and then hide within. A bait of meat or bird or small animal was put on top the camouflage, and then the hunter waited. After long and patient waiting an eagle might land on the bait. The waiting Indian would grasp the bird's legs and then kill it.

Because of the great importance of bison as food, clothing, and shelter to the Indians, many tribes adapted their living to the ways of the buffalo. Tribes would divide into hunting bands of twenty to thirty families, probably averaging less than 200 people to each band. Historians point out that these mobile groups were large enough to offer formidable resistance to enemies, yet small enough not to present any serious logistic problems while moving and hunting. The hunting bands moved slowly about in search of bison.

During late winter or early spring, hunters often stalked buffalo by creeping within bow and arrow range while under a wolf skin or buffalo robe. More than one hunter might share a buffalo robe. Needless to say, this method of hunting took painstaking patience and though a buffalo or two might be downed, there were ways in taking them in much larger numbers.



Indians hidden under a buffalo hide could often get within shooting range of bison.



Many of the plains Indians lived under a buffalo economy. When the buffalo vanished, their strength was destroyed.

Much of the hunting was a cooperative affair and involved a large number of people. Though the actual job of hunting was left to the men, women and boys might assist by acting as herders and noisemakers. One common method of cooperative hunting was the surround, which was executed with many variations. One surround has been described as follows:

After scouts had located a small band of bison and trotted back to the main party with news of their discovery, the hunting band veered from its course in order to approach the grazing buffalo from down-wind. Women of the party laboriously set up a temporary fence by burying travois in the earth with the small ends pointing up. The travois were quickly lashed together to form a tight barrier behind which the women and dogs hid.

In the meantime, the most fleet-footed of the Indian men had skirted the bison herd and getting up wind from them had turned the big beasts and cautiously begun to haze them toward the hastily constructed barrier. Others took up positions along an ever-narrowing corridor in order

to hold the buffalo on course toward the travois fence. When the herd finally approached the fence, men rushed in with bows and lances to kill what animals they could while women and even boys and dogs did what they could to hold the milling animals together.

Needless to say, such surrounds were not always successful, and were not without danger to the hunters.

Another commonly used device was the pound. This required more elaborate preparation than did the surround; consequently, once a pound was constructed it would be used as frequently as practicable.

Pounds were generally made at the foot of a small hill or dropoff with the entrance facing toward the hill. A circle, or sometimes three-sided corral was built with opening facing the hill. The pound might be constructed by piling trees one upon each other or by setting poles side by side in the earth and securely lashing them together. Sharpened stakes might be set between the posts and angled inward in order to stop buffalo from trying to go through the fence.

Long wings of brush, roots, rocks, dung, and any other available material were fanned out in piles sometimes for a mile or more from the pound entrance. Women, children, and some of the men hid behind these piles. As buffalo were herded into the wings, sentries hidden behind the mounds would appear and help to keep them headed toward the pound. Once in a pound, the doomed animals soon fell under a death-dealing hail of arrows and lances.

An innovation to the pound that could be used only during cold weather was a layer of poles above the pound entrance. The poles were covered with manure and water, and when frozen, this was a handy deterrent to the retreat of the bulky animals who could not get up the slippery incline.

One of the most dramatic death traps for game was the pishkun or jump. These were cliffs or other drops over which buffalo were stampeded much as they were driven into pounds. The big difference was that instead of depending upon an enclosure to hold the beasts until they were killed, the Indians depended upon them being killed or badly disabled from their fall. A ring of armed men and boys below the drop prevented wounded animals from getting away.

Sometimes, prairie grasses were set afire to panic and stampede the animals. Still another variation would be for a practiced runner dressed in a buffalo robe to actually lead a stampeding herd to the cliff edge. Horses were occasionally used for this purpose too, but once the horse came into wide use the buffalo jump went out of vogue. Often cooperative hunts were preceded by lengthy and elaborate rituals wherein the gods would be called upon to make the hunt a successful one. Planning of the drives and disposition of killed animals was rigidly controlled.

When horses became more common, they were not only a status symbol and measure of wealth, but they changed the methods of buffalo hunting. The buffalo jump and pound mostly went out of use, and surrounds and runs with horses became the most profitable hunting methods. During a run, mounted Indians would move in down-wind and unnoticed as closely as possible on a bison herd. Once near, or discovered, the riders would rush in on the flanks of the herd. Riding alongside the stampeding animals, the Indians would kill them at close range with arrows. Usually, it took more than one arrow to fell a buffalo, and a rider that could bring down four or five buffalo in one run had done a good job. Even when Indians had learned to use guns, they still preferred a bow and arrow when running buffalo.

Buffalo horses were not just a run-of-the-mill Indian Pony. They were carefully chosen for speed, spirit, and stamina, and they were carefully trained to touch commands. The Indian families that did not own a buffalo runner, and elders too old to ride the chase were dependent upon charity for a part of the buffalo kill.

Food was not always plentiful for the American Indian, so provisions were stored for lean times. One of the staple foods that could be kept for several years if properly cared for was pemmican.

To make pemmican, dried meat was first softened by warming it over a fire. It was then pulverized with a stone maul and mixed with melted fat and bone marrow. Quite often fruit or berry paste was mixed to give additional flavor, and the whole mixture was packed away into folded rawhide containers. Such a container was called a parfleche.

By the late 1870's the buffalo had all but vanished. Starvation roamed the plains and reservations. The Indian was a hunter no more.

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